

## ASSIGNMENT 8

Textbook Assignment: Unit 6, Lesson 3, "Refractivity." Pages 6-3-12 through 6-3-15.  
 Unit 6, Lesson 4, "Electrooptics." Pages 6-4-1 through 6-4-5.  
 Unit 6, Lesson 5, "Sound Focusing." Pages 6-5-1 through 6-5-7.  
 Unit 6, Lesson 6, "Tides and Tidal Computations." Pages 6-6-1 through 6-6-10.  
 Unit 6, Lesson 7, "Computing Sunrise and Sunset." Pages 6-7-1 through 6-7-11.  
 Unit 6, Lesson 8, "Computing Moonrise and Moonset, and Percent Illumination." Pages 6-8-1 through 6-8-8.  
 Unit 6, Lesson 9, "Radiological Fallout." Pages 6-9-1 through 6-9-22.  
 Unit 7, Lesson 1, "Maintenance of Meteorological and Oceanographic Files, Records, Directives, Publications, and Charts." Pages 7-1-1 through 7-1-12.

<div style="border-bottom: 1px solid black; padding-bottom: 5px;"> <p>Learning Objective Define anomalous propagation.</p> </div> <p>8-1. Which of the following situations may be a result of anomalous propagation?</p> <ol style="list-style-type: none"> <li>1. A ship can be seen visually on the horizon but not be detected by radar</li> <li>2. An aircraft at 10,000 ft can be seen visually by not be detected by radar</li> <li>3. Returns appear on the radar PPI and RHI scopes at a certain range, but no actual object is present at that range which could cause the return</li> <li>4. Each of the above</li> </ol>	<p>8-3. Which of the following particles reflect light?</p> <ol style="list-style-type: none"> <li>1. All particles smaller than the wavelength in question</li> <li>2. All particles equal or larger than the wavelength in question</li> <li>3. All particles equal or larger than about .4 <math>\mu</math></li> <li>4. All particles smaller than about .4 <math>\mu</math></li> </ol> <p>8-4. Which of the following processes causes our skies to appear blue?</p> <ol style="list-style-type: none"> <li>1. Reflection</li> <li>2. Transmission</li> <li>3. Raleigh Scattering</li> <li>4. Mie Scattering</li> </ol> <p>8-5. What is a black body?</p>
<div style="border-bottom: 1px solid black; padding-bottom: 5px;"> <p>Learning Objective: Identify the visible portion of the electromagnetic spectrum, and the processes within the atmosphere that affect it.</p> </div> <p>8-2. What is the range of wavelengths for visible light (violet through red)?</p> <ol style="list-style-type: none"> <li>1. 4 to 78 <math>\mu</math></li> <li>2. .4 to .78 <math>\mu</math></li> <li>3. .004 to .0078 cm</li> <li>4. .000004 to .0000078 m</li> </ol>	<ol style="list-style-type: none"> <li>1. Any object with an absorptivity of 100 units</li> <li>2. A theoretical object with an infinite absorptivity (all energy is absorbed)</li> <li>3. A theoretical object that will reflect 100% of the energy striking it</li> <li>4. A theoretical object that will transmit 100% of the energy striking it</li> </ol> <div style="border-top: 1px solid black; padding-top: 5px;"> <p>Learning Objective: Identify the four factors affecting target detection.</p> </div>

8-6. What are the four factors that affect target detection?

1. Weather elements absorbing, reflecting, scattering, and transmitting energy
2. Target size, target distance, target to background contrast, and weather
3. Target reflectivity, target absorptivity, target transmissivity, and target to background contrast
4. Time of day, illumination of the target, target reflectivity, and target to background contrast

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Learning objective:  
Identify the various types of target acquisition systems and identify the most proficient system.

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8-7. What is the most capable target acquisition system?

1. TV sensors
2. FLIR (forward-looking infrared) sensors
3. Visual and IR laser sensors
4. The human eye

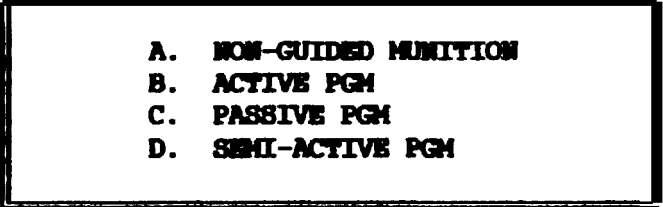
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Learning Objective  
Identify the two major components of a precision guided munition (PGM).

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8-8. What does the control unit of a PGM do?

1. It redirects thrust by controlling the engine or adjusting ailerons to keep the PGM on course
2. It processes energy input levels to determine if the unit is aimed at the energy contrast pattern that has been designated as a target
3. It provides the thrust which accelerates the PGM
4. It converts received electromagnetic energy to electronic impulses



**A. NON-GUIDED MUNITION**  
**B. ACTIVE PGM**  
**C. PASSIVE PGM**  
**D. SEMI-ACTIVE PGM**

FIGURE 8A

IN ANSWERING QUESTIONS 8-9 THROUGH 8-11, CHOOSE THE TYPE OF SYSTEM FROM FIGURE 8A THAT BEST MATCHES THE DESCRIPTION GIVEN IN THE QUESTION.

8-9. A "Stinger" hand-held anti-aircraft missile that emits a microwave signal which reflects off a target. The missile is armed only upon recognition of a high Doppler shift in the reflected signal from a hostile aircraft (i.e. a rapidly approaching aircraft or a spinning prop or rotor blade).

1. A
2. B
3. C
4. D

8-10. A "Copperhead" artillery round that is shot from a tank, howitzer, or shipboard gun barrel. This munition deploys wings in flight and homes in on a spot of laser energy reflected off the target. Laser target designators are carried aboard aircraft, tanks, or by men deployed in the field.

1. A
2. B
3. C
4. D

8-11. "Maverick" air-to-air/air-to-ground missile: TV images "seen" by the missile are relayed to the aircraft cockpit or to a remote console. Automatic processors aboard the missile keep the weapon on course to the designated target. Commands may be sent to the missile by the aircraft or a remote console to correct major course deviations.

1. A
2. B
3. C
4. D

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Learning Objective:  
Identify the advantages and disadvantages of PGMs.

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- A. TURBULENCE**  
**B. LIGHTNING/TRIBOELECTRIFICATION**  
**C. HIGH MOISTURE (CLOUDS OR PRECIPITATION)**  
**D. ICING**  
**E. HAIL**

FIGURE 8B

REFER TO FIGURE 8B TO ANSWER QUESTIONS 8-12 THROUGH 8-15.

8-12. Which phenomenon can damage sensor units by ablation and dent or bend control surfaces?

1. A
2. B
3. D
4. E

8-13. Which phenomenon can refract/absorb visual and IR energy reflections from the target and prevent lock-on or significantly degrade lock-on range?

1. A
2. C
3. D
4. E

8-14. Which phenomenon can overload and burn out PGM onboard sensor units or cause erratic electronic impulses?

1. A
2. B
3. C
4. D

8-15. Which phenomenon can cause the PGM flight to shift erratically and cause the PGM sensor to break lock-on?

1. A
2. B
3. C
4. E

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Learning Objective:  
Identify the atmospheric elements that control blast waves in the atmosphere.

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8-16. What happens to sound waves if the sound velocity increases with altitude?

1. Sound waves are refracted upward and sound intensity near the surface increases
2. Sound waves are refracted upward and sound intensity near the surface decreases
3. Sound waves are refracted downward and sound intensity near the surface increases
4. Sound waves are refracted downward and sound intensity near the surface decreases

8-17. Which of the following meteorological elements affects the speed of sound the least?

1. Air temperature
2. Wind velocity
3. Relative humidity

8-18. If the azimuth of interest is  $270^\circ$  and the winds are  $080^\circ$  at 20 knots, what entry should be made in column (5) of the wind-speed component worksheet?

1. 10
2. -10
3. -20
4. 80

8-19. What is an "azimuth of interest"?

1. A direction, measured from true north, from a blast point to a location of interest
2. A direction, measured from true north, from a location of interest to a blast point
3. A direction, measured from magnetic north, from a blast point to a location of interest
4. A direction, measured from magnetic north, from a location of interest to a blast point

8-20. The column (7) entry on a wind-speed component worksheet is -15, and the temperature is  $25^\circ\text{C}$ . What is the speed of sound?

1. 658 kt
2. 660 kt
3. 685 kt
4. 686 kt

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Learning Objective:  
Identify sound focus categories and sound speed criteria.

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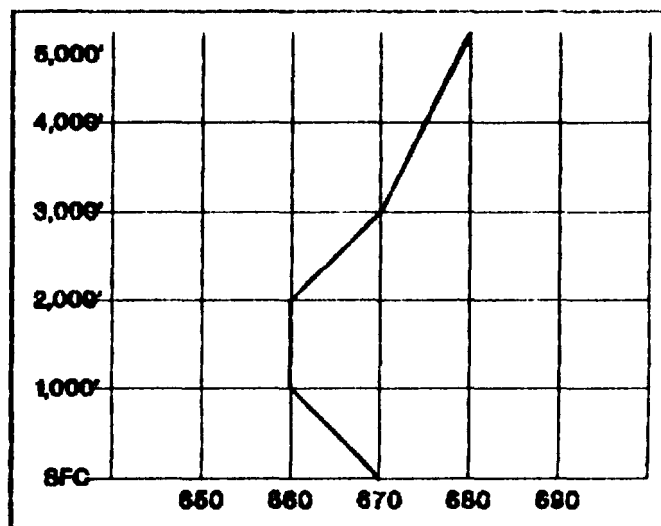


FIGURE 8C

REFER TO FIGURE 8C, A SPEED OF SOUND PLOTTING DIAGRAM, TO ANSWER QUESTION 8-21.

8-21. What category of sound focusing will occur?

1. Nil
2. Slight
3. Moderate
4. Heavy

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Learning Objectives  
Recognize the effect of the Sun and the Moon on tides.

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8-22. In the low and middle latitudes, how much earlier or later does the noon rise and set each day?

1. 50 min earlier
2. 50 min later
3. 1 hr 50 min earlier
4. 1 hr 50 min later

8-23. When do spring tides occur?

1. Full moon
2. New moon
3. Both 1 and 2 above
4. Quarter moon

8-24. Other than the position of the Sun and the Moon in relation to the Earth, which factor has the greatest control on the normal tides?

1. Winds
2. Temperature
3. Season of the year
4. Coastal configuration and bathymetry

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#### Learning Objectives

Identify the four volumes of Tide Tables and recognize how the information is used to compute tides.

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8-25. Which of the seven tables in each Tide Tables are necessary to compute tides for subordinate stations?

1. Moonrise and Moonset; Local Mean Time of Sunrise and Sunset; and Tidal Differences and Other Constants
2. Tidal Differences and Other Constants; Height of Tide At Any Time; and Moonrise and Moonset
3. Daily Tide Predictions\ Height of Tide At Any Time; and Moonrise and Moonset
4. Daily Tide Predictions; Tidal Differences and Other Constants and Height of Tide At Any Time

8-26. What is a "Reference Station"?

1. A location for which daily tide predictions have been computed
2. A location for which only tidal differences from daily predictions from some other location are provided
3. A location for which typical tidal curves have been computed
4. A location for which tidal differences are unknown or unreliable

8-27. How are "Subordinate Stations" listed in the Tidal Differences and Other Constants table?

1. Alphabetically
2. Numerically by station number
3. Geographically along coastlines
4. Geographically by region from westernmost to easternmost

**Daily Predictions - Wilmington NC  
1990**

**October**

Time		Height	
h	m	ft	cm
1	0109	0.4	12
M	0640	4.3	131
	1326	0.3	9
	1910	4.7	143

**Time Meridian 75°W.**

**FIGURE 8D**

**Station 2721 Orton Pt, NC 34°03'N  
077°56'W**

**Ranges: Mean 4.0 ft Spring 4.4 ft**

**Mean Tide Level 2.2 ft**

**Differences (based on Wilmington)**

Time		Height	
High	Low	High	Low
Water	Water	Water	Water
h	m	ft	ft
-0	34	*0.98	*1.06

**FIGURE 8E**

REFER TO FIGURE 8D, SELECTED INFORMATION FROM

A DAILY PREDICTION TABLE, AND FIGURE 8E, INFORMATION FROM THE TIDAL DIFFERENCES AND OTHER CONSTANTS TABLE, TO ANSWER QUESTIONS 8-28 AND 8-29.

8-28. What is the time of the highest-high tide at Orton Point, North Carolina on 1 October 1990?

1. 1252 EST
2. 1814 EST
3. 1836 EST
4. 1910 EDT

8-29. What is the height of the highest high tide at Orton Point on 1 October 1990?

1. 4.3 ft
2. 4.6 ft
3. 4.7 ft
4. 5.0 ft

Learning Objective:  
Identify the terms relating to tidal currents.

- A. STAND
- B. SLACK WATER
- C. EBB TIDE
- D. FLOOD TIDE

**FIGURE 8F**

REFER TO FIGURE 8F TO ANSWER QUESTIONS 8-30 THROUGH 8-33.

8-30. Which term refers to the flow of water into a bay or harbor or is generally associated with the stage of the tide when the water is rising?

1. A
2. B
3. C
4. D

8-31. Which term refers to the flow of water out of a bay or harbor or is generally associated with the stage of the tide when the water is falling?

1. A
2. B
3. C
4. D

8-32. Which term refers to the period of time when there is no horizontal movement of water?

1. A
2. B
3. C
4. D

8-33. Which term refers to the period of time when there is no vertical rise or lowering of the water level?

1. A
2. B
3. C
4. D

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Learning Objective:  
Calculate the times of  
Sunrise and Sunset.

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REFER TO TABLE 6-7-1 TO ANSWER QUESTIONS  
8-34 AND 8-35.

8-34. At what Local Mean Time (LMT) will  
sunset occur on 9 August at  
31°00'N?

1. 1847 LMT
2. 1848 LMT
3. 1849 LMT
4. 1854 LMT

8-35. At what LMT till sunset occur on 17  
July at 49°00'N?

1. 1948 LMT
2. 1956 LMT
3. 1958 LMT
4. 1959 LMT

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Learning Objective:  
Identify the procedure used  
to convert LMT to LST and  
UTC.

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8-36. If sunrise occurs at 0700 LMT at  
40°00'N 087°32'W, what time does it  
occur at that point in Local  
Standard Time?

1. 0650
2. 0652
3. 0708
4. 0710

8-37. What is the UTC time if the Local  
Standard Time at 90°W is 0700?

1. 0100
2. 0600
3. 0700
4. 1300

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Learning Objective: Define  
"Twilight" and identify the  
tables and the procedures  
used in twilight  
computations.

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8-38. Which of the following states the  
correct order of occurrence during  
the evening?

1. Sunset, Nautical Twilight.  
Civil Twilight, Astronomical  
Twilight
2. Civil Twilight, Sunset,  
Nautical Twilight, Astronomical  
Twilight
3. Sunset, Civil Twilight,  
Nautical Twilight, Astronomical  
Twilight
4. Sunset, Civil Twilight,  
Astronomical Twilight, Nautical  
Twilight

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Learning Objective:  
Identify the two factors in  
the Moon's orbit that cause  
daily changes in the time of  
moonrise and moonset.

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8-39. What is the Moon's maximum ecliptic  
orbit angle?

1. 18 1/2°
2. 23 1/2°
3. 27°
4. 28 1/2°

8-40. When the Moon is closest to the  
Earth in its orbit, what is this  
called?

1. Apogee
2. Perigee
3. Elliptic period
4. Ecliptic period

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Learning Objective:  
Identify the steps used to  
compute moonrise and moonset  
from the Air Almanac.

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8-41. Where are the times of moonrise located in the *Air Almanac*?

1. In the Daily listing on the upper right corner of the A.M. page
2. In the Daily listing on the lower left corner of the A.M. page
3. In the Daily listing on the upper right corner of the P.M. page
4. In the Daily listing on the lower left corner of the P.M. page

8-42. Which two procedures must you do to the moonrise/moonset information provided on the Daily listing pages before you may convert longitude arc to time?

1. Interpolate for longitude and then correct for altitude
2. Interpolate for latitude then correct for longitude
3. Interpolate for longitude then interpolate time difference and latitude for the time correction
4. Interpolate for latitude then find the time correction based on the time difference and the latitude

REFER TO TABLES 6-8-1 AND 6-8-2 IN THE TRAMAN TO ANSWER QUESTIONS 8-43 AND 8-44.

8-43. What was the correct LMT for moonset on August 1, 1990 at 50°00'S 90°00'W?

1. 0407
2. 0410
3. 0413
4. 0418

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Learning Objective: Relate the age of the Moon in days to the percent of illumination available.

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8-44. What was the range of Lunar illumination on August 1, 1990?

1. 01% ±1%
2. 67% ±5%
3. 77% ±5%
4. 85% ±4%

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Learning Objective:  
Recognize how weapon yield and burst type effect RADPO.

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8-45. Which of the following bursts will produce the most widespread fallout?

1. A 1-Kt burst at the surface
2. A 10-Kt burst at the surface
3. A 15-Kt low-air burst
4. A 15-Kt high-air burst

8-46. Which of the following bursts will produce the heaviest fallout?

1. A 10-Kt high-air burst
2. A 10-Kt low-air burst
3. A 100-Kt low-air burst
4. A 10-Kt surface burst

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Learning Objective Diagram the zones of the most hazardous fallout using the information contained in the Basic Wind Data Message.

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### **SITUATION**

**A Basic Wind Data Message gives a layer 4 (2,000 to 4,000 m) wind data group of 070040. You have a 1:100,000 scale chart available.**

FIGURE 8G

REFER TO FIGURE 8G TO ANSWER QUESTIONS 8-47 AND 8-48.



- 8-47. In which general direction should your vector arrow point?
1. NE
  2. SE
  3. SW
  4. NW
- 8-48. The vector drawn for layer 4 should be how long?
1. 20.0 cm
  2. 23.6 cm
  3. 38.4 cm
  4. 43.6 cm

REFER TO FIGURE 6-9-3 IN THE TRAMAN TO ANSWER QUESTION 8-49.

- 8-49. You have been notified of a 25-Kt weapon burst. What is the cloud bottom height?
1. 7,100 meters
  2. 7,400 meters
  3. 7,600 meters
  4. 11,500 meters

### **SITUATION**

Upon plotting the 2/3 stem, cloud base, and cloud top radials on your wind vector plot, you determine that the 2/3 stem radial is 010°, the CB radial is 040°, and the CT radial is 050°.

FIGURE 8H

REFER TO FIGURE 8H TO ANSWER QUESTION 8-50.

- 8-50. What is the EDD?

1. 010°
2. 020°
3. 030°
4. 040°

### **SITUATION**

For a 10-Kt weapon yield, you measure the length of the EDD (from GZ to the wind vector plot from your NAV Basic Wind Data Message) as 45 cm on a 1:100,000 chart.

### **REMEMBER:**

1: 50,000 scale, 1 cm = 0.5 km  
 1:100,000 scale, 1 cm = 1.0 km  
 1:250,000 scale, 1 cm = 4.0 km

and,

1 km = 0.53946 nmi  
 1 nmi = 1.852 km

FIGURE 8I

REFER TO FIGURE 8I TO ANSWER QUESTIONS 8-51 THROUGH 8-53.

- 8-51. Which of the following EDDs is represented by the 45-cm vector plot?

1. 2.4 nmi
2. 24.3 nmi
3. 242.8 nmi
4. 2427.6 nmi

- 8-52. Which, if any, of the following is the EDF speed?

1. 13.5 kt
2. 46.3 kt
3. 134.9 kt
4. None of the above

- 8-53. Which, if any, of the following is the Zone I distance?

1. 7.0 nmi
2. 9.5 nmi
3. 18.0 nmi
4. None of the above

- 8-54. How do you determine the Zone II distance?

1. EDF times 2
2. Zone I distance times 2/3
3. Zone I distance times 2
4. Zone I distance times 3

8-55. What does the line "ZULU" of an Effective Downwind Message provide?

1. The surface wind direction and wind speed
2. A system identification from the computer that calculated the data
3. Effective Date/Time Group (UTC) of the beginning of the 24-hour valid period for the winds
4. Date/Time Group (UTC) of the upper wind data used to compute the EDM data

8-56. How are expansion angles transmitted in the EDM?

1. In plain language following the wind group
2. In parenthesis following the wind group
3. As an extra digit at the end of the wind group
4. Both 2 and 3 above

8-57. For what purpose is the "CHARLIE" group of the EDM provided?

1. 2- to 5-Kt weapons
2. 5- to 30-Kt weapons
3. 30- to 100-Kt weapons
4. 100- to 300-Kt weapons

**SITUATION**

**A 3-Kt detonation has occurred at 1000UTC bearing 270°True at 15 nmi from your ship.**

**The NAV EDM, received 2 hours ago, gives an "ALPHA" group as 095020.**

FIGURE 8J

REFER TO FIGURE 8J TO ANSWER QUESTIONS 8-58 AND 8-59.

8-58. How long will it take for the fallout to reach your ship's 1000UTC position?

1. 15 min
2. 30 min
3. 45 min
4. 1 hr 15 min

8-59. Where is the ship at 1000UTC?

1. Burst radius
2. Zone I
3. Zone II
4. Outside of Zone I and Zone II

Learning Objective; Define the terms directive, instruction, notice, change transmittal, files, records, publications, charts, and forms.

- A. DIRECTIVE**  
**B. INSTRUCTION**  
**C. NOTICE**  
**D. CHANGE TRANSMITTAL**

FIGURE 8K

REFER TO FIGURE 8K TO ANSWER QUESTIONS 8-60 THROUGH 8-63.

8-60. Which term is the general description that includes all of the other terms?

1. A
2. B
3. C
4. D

8-61. Which term describes a product that remains in effect until superseded or cancelled?

1. A
2. B
3. C
4. D

8-62. Which term describes a product that is used to correct, update, or modify an existing product?

1. A
2. B
3. C
4. D

8-63. Which term describes a product that contains a self-cancelling provision?

1. A
2. B
3. C
4. D

8-64. What reference manual is used to assign SSIC's?

1. SECNAVINST 5210.11
2. NAVOCEANCOMNOTE 5215
3. NAVPUBINST 5215.1
4. NAVOCEANCOMINST 3142.1

8-65. Which of the following directives list(s) current Naval Oceanography Command instructions?

1. SECNAVINST 5210.11
2. NAVOCEANCOMNOTE 5215
3. NAVPUBINST 5215.1
4. Both 2 and 3 above

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Learning Objective: Define the terms cut-off date, retention period, transfer date, and disposal date, and identify the tasks involved with file maintenance.

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- A. CUT-OFF DATE**  
**B. RETENTION PERIOD**  
**C. TRANSFER DATE**  
**D. DISPOSAL DATE**

**FIGURE 8L**

REFER TO FIGURE 8L TO ANSWER QUESTIONS 8-66 THROUGH 8-69.

8-66. Which term describes the date on which a file is closed and no new material may be added to the file?

1. A
2. B
3. C
4. D

8-67. Which term describes the date at the end of the required retention period for temporary records?

1. A
2. B
3. C
4. D

8-68. Which term describes the date at the end of the required retention period for permanent records?

1. A
2. B
3. C
4. D

8-69. Which term refers to the period of time that information must be kept available for reference, before being destroyed or transferred?

1. A
2. B
3. C
4. D

8-70. Which of the following publications lists retention periods for all types of record material?

1. SECNAVINST 5210.11
2. SECNAVINST 5212.5
3. NAVPUBINST 5215.1
4. NAVOCEANCOMNOTE 5215

8-71. What is the retention period for all meteorological and oceanographic observation records (before they are transferred to a permanent records facility)?

1. 1 mo
2. 1 yr
3. 3 yr
4. 4 yr

8-72. After 6 months, what should be done with the copy of a DD 175-1 retained by the briefing organization?

1. It should be placed in permanent storage at a Federal Records Center
2. It should be placed in a closed file
3. It should be destroyed
4. It should be placed in a cardboard box, moved to an out-of-the-way storeroom, then destroyed after 3 years

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Learning Objective:  
Identify the manuals that list the publications and forms required by activities supporting various meteorological and oceanographic functions, and identify the source manuals for information about climatic publications and summaries.

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8-73. Which of the following publications or directive identifies required publications for various Naval Oceanography Command Units, afloat geophysics units, and Marine Corps weather units?

1. NAVAIR 00-35QL-22 (Section L)
2. NAVOCEANCOMINST 5605.2
3. NAVOCEANO SP 3-P
4. NAVPUSINST 5215

8-74. Which of the following publications provide(s) listings of climatic studies available for government use?

1. NA 50-1C-534
2. NOCDASHVILLENOTE 3146
3. AWS/TC-(Current year)/001
4. All of the above

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Learning Objective:  
Identify the source manual containing information about various meteorological and oceanographic charts.

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8-75. Which DoD, Defense Mapping Agency *Catalog of Maps, Charts, and Related Products*, part and volume contains information on weather plotting charts?

1. Part 2, volume II
2. Part 1, volume I
3. Part 1, volume II
4. Part 1, volume III